AUDIO DIVISION

LAW OFFICES

MILLER AND NEELY, P. C.

SUITE 704
6900 WISCONSIN AVENUE
BETHESDA, MD 20815

TEL: (301) 986-4160
FAX: (301) 986-4162

JERROLD D. MILLER
JOHN S. NEELY*

*ADMITTED PA AND DC ONLY

Received & Inspected
MAR 22 2010
FCC Mail Room

732232

March 18, 2010

ORIGINAL + FILE FEE SENT TO ST. LOUIS.

Federal Communications Commission
Media Bureau Services
P.O. Box 979089
St. Louis, MO 63197

ATTN: Audio Division (AM)

RE: **Application for Broadcast License**
Request for Written Program Test Authority
KCBC(AM) Manteca, California
FAC: 34587

Dear Madam Secretary:

Transmitted herewith in triplicate on behalf of Kiertron, Inc., licensee of the above-referenced station, is FCC Form 302-AM, an application for broadcast license to cover Construction Permit File No. BP-20090820ABR.

Written Program Test Authority is specifically requested.

The Filing fee for this application is $1320.00. The filing fee codes are MMR and MOR. Any questions concerning this matter should be addressed to the undersigned.

Sincerely,

John S. Neely

encs.

BMML
ANJ

Received & Inspected

MAR 22 2010

FCC Mail Room

Federal Communications Commission
Washington, D. C. 20554

Approved by OMB
3060-0627
Expires 01/31/98

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

FOR COMMISSION USE ONLY
FILE NO. BMML-20100322AES

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial)

Kiertron, Inc.

Copy notices and communications to:

MAILING ADDRESS (Line 1) (Maximum 35 characters)
P.O. Box 3003

Miller and Neely, PC
6900 Wisconsin Ave., Suite 704

MAILING ADDRESS (Line 2) (Maximum 35 characters)

Bethesda MD 20815

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Blue Bell	PA	19422

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
(215) 628-3500	KCBC	FRN: 0001-5196-10

2. A. Is a fee submitted with this application? FACID 34587 ☑ Yes ☐ No

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section

☐ Governmental Entity ☐ Noncommercial educational licensee ☐ Other (Please explain):

C. If Yes, provide the following information:

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A) FEE TYPE CODE	(B) FEE MULTIPLE	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
MMR	0001	$ 615.00	

To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)	(B)	(C)	FOR FCC USE ONLY
MOR	0001	$ 705.00	

0001519610

ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.

TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
$ 1,320.00	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Kiertron, Inc. FRN 0001519610		
MAILING ADDRESS P.O. Box 3003		
CITY Blue Bell	STATE PA	ZIP CODE 19422

2. This application is for:

☑ Commercial ☐ Noncommercial

☑ AM Directional ☐ AM Non-Directional

Call letters	Community of License	Construction Permit File No.	Modification of Construction Permit File No(s).	Expiration Date of Last Construction Permit
KCBC	Manteca, CA	BP-20090820ABR	N/A	12/10/2012

FACID 34587

3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620?

☐ Yes ☑ No

If No, explain in an Exhibit. Program test requested.

Exhibit No. E-1

4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met?

☑ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No. N/A

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect?

☐ Yes ☑ No

If Yes, explain in an Exhibit.

Exhibit No. N/A

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?

☐ Yes ☐ No

☑ Does not apply

If No, explain in an Exhibit.

Exhibit No. N/A

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?

☐ Yes ☑ No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed; and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No. N/A

8. Does the applicant, or any party to the application, have a petition on file to migrate to the expanded band (1605-1705 kHz) or a permit or license either in the existing band or expanded band that is held in combination (pursuant to the 5 year holding period allowed) with the AM facility proposed to be modified herein?

☐ Yes ☒ No

If Yes, provide particulars as an Exhibit.

Exhibit No.

The APPLICANT hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because use of the same, whether by license or otherwise, and requests and authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended).

The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

CERTIFICATION

1. By checking Yes, the applicant certifies, that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862, or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 C.F.R. Section 1.2002(b).

☒ Yes ☐ No

2. I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Name	Signature	
Fred B Crawford		
Title	Date	Telephone Number
[illegible]	3/16/10	

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The Commission will use the information provided in this form to determine whether grant of the application is in the public interest. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in this form to another government agency. In addition, all information provided in this form will be available for public inspection. If information requested on the form is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested authorization.

Public reporting burden for this collection of information is estimated to average 639 hours and 53 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0627), Washington, D. C. 20554. Do NOT send completed forms to this address.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant: Kiertron, Inc.

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☑ Station License ☐ Direct Measurement of Power

1. Facilities authorized in construction permit

Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
KCBC FAC 34587	BP-20090820ABR	770	Unlimited	4.1	50.0

2. Station location

State	City or Town
California	Manteca

3. Transmitter location

State	County	City or Town	Street address (or other identification)
CA	Stanislaus	Oakdale	10948 Cleveland Ave.

4. Main studio location

State	County	City or Town	Street address (or other identification)
CA	Stanislaus	Oakdale	10948 Cleveland Ave.

5. Remote control point location (specify only if authorized directional antenna)

State	County	City or Town	Street address (or other identification)
CA	Stanislaus	Oakdale	10948 Cleveland Ave.

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☑ No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☑ Yes ☐ No ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. E-1

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system	RF common point or antenna current (in amperes) without modulation for day system
9.41	32.44
Measured antenna or common point resistance (in ohms) at operating frequency	**Measured antenna or common point reactance (in ohms) at operating frequency**
Night: 50 Day: 50	Night: 0 Day: 0

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1	-135.7	-99.4	0.658	0.235	---	---
2	0.0	0.0	1.000	1.000	---	---
3	+149.9	+101.5	0.662	0.879	---	---

Manufacturer and type of antenna monitor: Potomac Instruments Type 1901

SECTION III - Page 2

9. Description of antenna system ((f directional antenna is used, the information requested below should be given for each element of the array. Use separate sheets if necessary.)

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
See E-1	See E-1	See E-1	See E-1	Exhibit No. N/A

Excitation ☑ Series ☐ Shunt

Tower #1 ASR 1012846
#2 1012847
#3 1012848

Geographic coordinates to nearest second. For directional antenna give coordinates of center of array. For single vertical radiator give tower location.

North Latitude	37 °	47 '	51 "	West Longitude	120 °	53 '	01 "

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No. N/A

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. Exhibit No. On File

10. In what respect, if any, does the apparatus constructed differ from that described in the application for construction permit or in the permit?

None.

11. Give reasons for the change in antenna or common point resistance.

N/A

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Name (Please Print or Type)	Signature (check appropriate box below)
W.C. Alexander	
Address (include ZIP Code)	Date
2150 W. 29th Ave. Suite 300 Denver, CO 80211	03/16/2010
	Telephone No. (Include Area Code) (303) 433-0104

☑ Technical Director

☐ Registered Professional Engineer

☐ Chief Operator

☐ Technical Consultant

☐ Other (specify)

EXHIBIT E-1

APPLICATION FOR LICENSE INFORMATION
RADIO STATION KCBC
MANTECA, CALIFORNIA

Kiertron, Inc.

March 16, 2010

770 kHz 50 kW-D/4.1 kW-N DA-2

CRAWFORD
BROADCASTING
COMPANY

EXECUTIVE SUMMARY

This engineering exhibit supports an application for license to cover a construction permit for a change in nighttime facilities for radio station KCBC, Manteca, California (FCC FID No. 34587, BP-20090820ABR) pursuant to the AM technical rules permitting moment-method modeling of eligible AM directional arrays [47 C.F.R. §73.151(c)].

KCBC is currently licensed on 770 kHz with 50 kW day and 1 kW night using the same directional parameters day and night. No changes were made to the daytime facilities, but the nighttime power has been increased to 4.1 kW with new directional parameters. It is desired to license both the day and night facilities pursuant to the AM modeling option.

Information is provided herein showing that the directional antenna parameters for the day and night patterns authorized by the FCC have been determined in accordance with the requirements of 47 C.F.R. §73.151(c). The system has been adjusted to produce antenna monitor parameters within ±5 percent in ratio and ±3 degrees in phase of the modeled values, as required by the Rules. A modified station license is requested herewith specifying the new daytime operating parameters.

As authorized by BSTA-20100111ACY, KCBC is presently operating using the moment-method determined base operating parameters with 50 kW day and 1 kW night. Program test authority is requested herewith.

Analysis of Tower Impedance Measurements to Verify Method of Moments Model

Tower base impedance measurements were made at the final J-plugs within the Antenna Tuning Units (ATUs) using a General Radio 1606B impedance bridge. The other towers were all open-circuited at the same points where the impedance measurements were made for them. This arrangement left only the short feed tubing between the ATU outputs and the tower base in series in the impedance measurements. Static drain chokes are situated upstream of the output J-plug and sample transformer at each tower and as such were not a factor in the base impedance measurements nor the antenna circuit models.

ACSModel (MININEC 3.1 core) was used to model the KCBC daytime array.

A lumped load with a reactance of –j10,000 was modeled at the base of the other towers to simulate an open circuit at each tower base.

The tower heights were adjusted in the model in order to achieve calibration of the model with the measured base impedances. All modeled tower heights were within 75 to 125 percent of the physical tower height as required by the FCC Rules.

The modeled radius for each tower was the physical radius of the tower as determined by the formula $3T/2\pi$, where T is the tower face width in meters. The KCBC radiators are uniform cross-section triangular towers and have face widths of 0.4827 meters. Each tower's radius was modeled at 0.23 meters.

Each tower is fed with a short length of large-diameter copper tubing that exhibits a small amount of series inductive reactance. This tubing connects to each tower immediately above the base insulator.

A circuit model was constructed for each tower using the assumed series feed tubing and shunt base region reactances. This model was used with the Westberg Circuit Analysis Program (WCAP) to determine the effects of these reactances on the ATU output impedance at each tower. In each of the WCAP tabulations, node 2 represents the ATU output reference point and node 3 represents the tower base. Node 0 represents ground potential. The ATU output impedances can be found in the "TO NODE IMPEDANCE" column of each WCAP tabulation, following the phantom 1.0 ohm resistor inserted in the model to provide a calculation point for the impedance. The complex base impedance of each tower from the moment method model is represented in each case by the complex load from node 3 to ground. A value of 80 pF was assumed for the base insulator, and this appears in the WCAP tabulation from node 3 to ground as 0.001 (microfarads) due to rounding. The WCAP circuit model tabulation immediately follows the model for each tower.

§73.151(c)(1)(vii) permits the use of a lumped series inductance of 10 uH or less between the output port of each antenna tuning unit and the associated tower. In each case, the value of lumped series inductance was below this 10 uH limit.

The modeled and measured impedances at the ATU output J-plugs with the other towers open-circuited at their ATU output J-plugs agree within ±2 ohms and ±4 percent as required by the FCC rules.

Table 1 – Analysis of Tower Impedance Measurements to Verify Moment Method Model

Twr.	Z_{BASE} (Modeled)	Z_{ATU} (Modeled)	Z_{ATU} (Measured)	Series L (uH)	Shunt C pF	Phys. Height (deg.)	Model Height (deg.)	% Phys. Height
1	35.0 –j1.8	34.9 +j15.2	35.0 +j15.2	3.63	80	81.7	85.600	104.8
2	33.2 –j4.4	33.0 +j9.0	33.2 +j9.0	2.87	80	81.7	85.575	104.7
3	34.8 –j2.7	34.7 +j13.6	34.7 +j13.6	3.47	80	81.7	85.800	105.0

****
ACSModel
(MININEC 3.1 Core)
01-08-2010 08:26:23
****

KCBC
Tower 1 Driven
Towers 2 and 3 Floating

Frequency = 0.770 MHz Wavelength = 389.35066 Meters

No. of Wires: 3

Wire No. 1 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
0	0	0		-1	
0	0	92.95747	0.23	0	20

Wire No. 2 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
36.46333	90.24991	0		-2	
36.46333	90.24991	92.5519	0.23	0	20

Wire No. 3 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
72.92666	180.4998	0		-3	
72.92666	180.4998	92.79524	0.23	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
0	0	0	0.23	-1	1	1
0	0	4.647873	0.23	1	1	2
0	0	9.295747	0.23	1	1	3
0	0	13.94362	0.23	1	1	4
0	0	18.59149	0.23	1	1	5
0	0	23.23937	0.23	1	1	6
0	0	27.88724	0.23	1	1	7
0	0	32.53511	0.23	1	1	8
0	0	37.18299	0.23	1	1	9
0	0	41.83086	0.23	1	1	10
0	0	46.47873	0.23	1	1	11
0	0	51.12661	0.23	1	1	12
0	0	55.77448	0.23	1	1	13
0	0	60.42235	0.23	1	1	14
0	0	65.07023	0.23	1	1	15
0	0	69.71809	0.23	1	1	16
0	0	74.36597	0.23	1	1	17
0	0	79.01385	0.23	1	1	18
0	0	83.66172	0.23	1	1	19
0	0	88.30959	0.23	1	0	20

Wire No. 2 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
36.46333	90.24991	0	0.23	-2	2	21
36.46333	90.24991	4.627595	0.23	2	2	22
36.46333	90.24991	9.25519	0.23	2	2	23
36.46333	90.24991	13.88278	0.23	2	2	24
36.46333	90.24991	18.51038	0.23	2	2	25
36.46333	90.24991	23.13797	0.23	2	2	26
36.46333	90.24991	27.76557	0.23	2	2	27
36.46333	90.24991	32.39317	0.23	2	2	28
36.46333	90.24991	37.02076	0.23	2	2	29
36.46333	90.24991	41.64835	0.23	2	2	30
36.46333	90.24991	46.27595	0.23	2	2	31
36.46333	90.24991	50.90354	0.23	2	2	32
36.46333	90.24991	55.53114	0.23	2	2	33
36.46333	90.24991	60.15873	0.23	2	2	34
36.46333	90.24991	64.78633	0.23	2	2	35
36.46333	90.24991	69.41393	0.23	2	2	36
36.46333	90.24991	74.04152	0.23	2	2	37
36.46333	90.24991	78.66911	0.23	2	2	38
36.46333	90.24991	83.29671	0.23	2	2	39
36.46333	90.24991	87.9243	0.23	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
72.92666	180.4998	0	0.23	-3	3	41
72.92666	180.4998	4.639762	0.23	3	3	42
72.92666	180.4998	9.279524	0.23	3	3	43
72.92666	180.4998	13.91929	0.23	3	3	44
72.92666	180.4998	18.55905	0.23	3	3	45
72.92666	180.4998	23.19881	0.23	3	3	46
72.92666	180.4998	27.83857	0.23	3	3	47
72.92666	180.4998	32.47834	0.23	3	3	48
72.92666	180.4998	37.1181	0.23	3	3	49
72.92666	180.4998	41.75786	0.23	3	3	50
72.92666	180.4998	46.39762	0.23	3	3	51
72.92666	180.4998	51.03738	0.23	3	3	52
72.92666	180.4998	55.67715	0.23	3	3	53
72.92666	180.4998	60.31691	0.23	3	3	54
72.92666	180.4998	64.95667	0.23	3	3	55
72.92666	180.4998	69.59643	0.23	3	3	56
72.92666	180.4998	74.23619	0.23	3	3	57
72.92666	180.4998	78.87596	0.23	3	3	58
72.92666	180.4998	83.51572	0.23	3	3	59
72.92666	180.4998	88.15548	0.23	3	0	60

Sources: 1
Pulse No., Voltage Magnitude, Phase (Degrees): 1, 1.0, 0.0

Number of Loads: 2
Pulse No., Resistance, Reactance: 21 , 0 ,-10000
Pulse No., Resistance, Reactance: 41 , 0 ,-10000

********** SOURCE DATA **********
Pulse 1 Voltage = (1.0, 0.0j)
Current = (0.0285, 0.0015j)
Impedance = (35.0, -1.828j)
Power = 0.014247 Watts

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = KCBC-1.CIR

I	1.0000	0	1	.0000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	3.6300	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	35.0000	3	0	-1.8280	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = .770

NODE	VOLT MAG	VOLT PHASE
1	39.0200	22.9318
2	38.1011	23.5177
3	35.0158	-3.8622

			BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE		
			MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE	VSWR
R	1-	2	1.000	1.00	.000	1.00	.000	35.94	15.20	34.94	15.20	
L	2-	3	3.630	17.56	90.000	1.00	.000	34.94	15.20	34.94	-2.36	
C	3-	0	.000	35.02	-3.862	.02	86.138	.00	-2296.61	.00	.00	
R	3-	0	35.000	35.02	-3.862	1.00	-.872	35.00	-1.83	.00	.00	

****
ACSModel
(MININEC 3.1 Core)
01-08-2010 08:26:58
****

KCBC
Tower 2 Driven
Towers 1 and 3 Floating

Frequency = 0.770 MHz Wavelength = 389.35066 Meters

No. of Wires: 3

Wire No. 1 X	Coordinates Y	Z	Radius	End Connection	No. of Segments
0	0	0		-1	
0	0	92.95747	0.23	0	20

Wire No. 2 X	Coordinates Y	Z	Radius	End Connection	No. of Segments
36.46333	90.24991	0		-2	
36.46333	90.24991	92.5519	0.23	0	20

Wire No. 3 X	Coordinates Y	Z	Radius	End Connection	No. of Segments
72.92666	180.4998	0		-3	
72.92666	180.4998	92.79524	0.23	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
0	0	0	0.23	-1	1	1
0	0	4.647873	0.23	1	1	2
0	0	9.295747	0.23	1	1	3
0	0	13.94362	0.23	1	1	4
0	0	18.59149	0.23	1	1	5
0	0	23.23937	0.23	1	1	6
0	0	27.88724	0.23	1	1	7
0	0	32.53511	0.23	1	1	8
0	0	37.18299	0.23	1	1	9
0	0	41.83086	0.23	1	1	10
0	0	46.47873	0.23	1	1	11
0	0	51.12661	0.23	1	1	12
0	0	55.77448	0.23	1	1	13
0	0	60.42235	0.23	1	1	14
0	0	65.07023	0.23	1	1	15
0	0	69.71809	0.23	1	1	16
0	0	74.36597	0.23	1	1	17
0	0	79.01385	0.23	1	1	18
0	0	83.66172	0.23	1	1	19
0	0	88.30959	0.23	1	0	20

Wire No. 2 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
36.46333	90.24991	0	0.23	-2	2	21
36.46333	90.24991	4.627595	0.23	2	2	22
36.46333	90.24991	9.25519	0.23	2	2	23
36.46333	90.24991	13.88278	0.23	2	2	24
36.46333	90.24991	18.51038	0.23	2	2	25
36.46333	90.24991	23.13797	0.23	2	2	26
36.46333	90.24991	27.76557	0.23	2	2	27
36.46333	90.24991	32.39317	0.23	2	2	28
36.46333	90.24991	37.02076	0.23	2	2	29
36.46333	90.24991	41.64835	0.23	2	2	30
36.46333	90.24991	46.27595	0.23	2	2	31
36.46333	90.24991	50.90354	0.23	2	2	32
36.46333	90.24991	55.53114	0.23	2	2	33
36.46333	90.24991	60.15873	0.23	2	2	34
36.46333	90.24991	64.78633	0.23	2	2	35
36.46333	90.24991	69.41393	0.23	2	2	36
36.46333	90.24991	74.04152	0.23	2	2	37
36.46333	90.24991	78.66911	0.23	2	2	38
36.46333	90.24991	83.29671	0.23	2	2	39
36.46333	90.24991	87.9243	0.23	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
72.92666	180.4998	0	0.23	-3	3	41
72.92666	180.4998	4.639762	0.23	3	3	42
72.92666	180.4998	9.279524	0.23	3	3	43
72.92666	180.4998	13.91929	0.23	3	3	44
72.92666	180.4998	18.55905	0.23	3	3	45
72.92666	180.4998	23.19881	0.23	3	3	46
72.92666	180.4998	27.83857	0.23	3	3	47
72.92666	180.4998	32.47834	0.23	3	3	48
72.92666	180.4998	37.1181	0.23	3	3	49
72.92666	180.4998	41.75786	0.23	3	3	50
72.92666	180.4998	46.39762	0.23	3	3	51
72.92666	180.4998	51.03738	0.23	3	3	52
72.92666	180.4998	55.67715	0.23	3	3	53
72.92666	180.4998	60.31691	0.23	3	3	54
72.92666	180.4998	64.95667	0.23	3	3	55
72.92666	180.4998	69.59643	0.23	3	3	56
72.92666	180.4998	74.23619	0.23	3	3	57
72.92666	180.4998	78.87596	0.23	3	3	58
72.92666	180.4998	83.51572	0.23	3	3	59
72.92666	180.4998	88.15548	0.23	3	0	60

Sources: 1
Pulse No., Voltage Magnitude, Phase (Degrees): 21, 1.0, 0.0

Number of Loads: 2
Pulse No., Resistance, Reactance: 1 , 0 ,-10000
Pulse No., Resistance, Reactance: 41 , 0 ,-10000

********** SOURCE DATA **********
Pulse 21 Voltage = (1.0, 0.0j)
Current = (0.0296, 0.0039j)
Impedance = (33.203, -4.419j)
Power = 0.014797 Watts

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = KCBC-2.CIR

I	1.0000	0	1	.0000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	2.9700	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	33.2000	3	0	-4.4190	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = .770

NODE	VOLT MAG	VOLT PHASE
1	35.2339	14.7954
2	34.2680	15.2224
3	33.4250	-8.4083

			BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE		
			MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE	VSWR
R	1-	2	1.000	1.00	.000	1.00	.000	34.07	9.00	33.07	9.00
L	2-	3	2.870	13.89	90.000	1.00	.000	33.07	9.00	33.07	-4.89
C	3-	0	.000	33.43	-8.408	.01	81.592	.00	-2296.61	.00	.00
R	3-	0	33.200	33.43	-8.408	1.00	-.827	33.20	-4.42	.00	.00

****
ACSModel
(MININEC 3.1 Core)
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****

KCBC
Tower 3 Driven
Towers 1 and 2 Floating

Frequency = 0.770 MHz Wavelength = 389.35066 Meters

No. of Wires: 3

Wire No. 1 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
0	0	0		-1	
0	0	92.57893	0.23	0	20

Wire No. 2 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
36.46333	90.24991	0		-2	
36.46333	90.24991	92.5519	0.23	0	20

Wire No. 3 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
72.92666	180.4998	0		-3	
72.92666	180.4998	92.79524	0.23	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
0	0	0	0.23	-1	1	1
0	0	4.628947	0.23	1	1	2
0	0	9.257894	0.23	1	1	3
0	0	13.88684	0.23	1	1	4
0	0	18.51579	0.23	1	1	5
0	0	23.14473	0.23	1	1	6
0	0	27.77368	0.23	1	1	7
0	0	32.40263	0.23	1	1	8
0	0	37.03157	0.23	1	1	9
0	0	41.66052	0.23	1	1	10
0	0	46.28947	0.23	1	1	11
0	0	50.91842	0.23	1	1	12
0	0	55.54736	0.23	1	1	13
0	0	60.17631	0.23	1	1	14
0	0	64.80525	0.23	1	1	15
0	0	69.4342	0.23	1	1	16
0	0	74.06315	0.23	1	1	17
0	0	78.69209	0.23	1	1	18
0	0	83.32104	0.23	1	1	19
0	0	87.94999	0.23	1	0	20

Wire No. 2 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
36.46333	90.24991	0	0.23	-2	2	21
36.46333	90.24991	4.627595	0.23	2	2	22
36.46333	90.24991	9.25519	0.23	2	2	23
36.46333	90.24991	13.88278	0.23	2	2	24
36.46333	90.24991	18.51038	0.23	2	2	25
36.46333	90.24991	23.13797	0.23	2	2	26
36.46333	90.24991	27.76557	0.23	2	2	27
36.46333	90.24991	32.39317	0.23	2	2	28
36.46333	90.24991	37.02076	0.23	2	2	29
36.46333	90.24991	41.64835	0.23	2	2	30
36.46333	90.24991	46.27595	0.23	2	2	31
36.46333	90.24991	50.90354	0.23	2	2	32
36.46333	90.24991	55.53114	0.23	2	2	33
36.46333	90.24991	60.15873	0.23	2	2	34
36.46333	90.24991	64.78633	0.23	2	2	35
36.46333	90.24991	69.41393	0.23	2	2	36
36.46333	90.24991	74.04152	0.23	2	2	37
36.46333	90.24991	78.66911	0.23	2	2	38
36.46333	90.24991	83.29671	0.23	2	2	39
36.46333	90.24991	87.9243	0.23	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
72.92666	180.4998	0	0.23	-3	3	41
72.92666	180.4998	4.639762	0.23	3	3	42
72.92666	180.4998	9.279524	0.23	3	3	43
72.92666	180.4998	13.91929	0.23	3	3	44
72.92666	180.4998	18.55905	0.23	3	3	45
72.92666	180.4998	23.19881	0.23	3	3	46
72.92666	180.4998	27.83857	0.23	3	3	47
72.92666	180.4998	32.47834	0.23	3	3	48
72.92666	180.4998	37.1181	0.23	3	3	49
72.92666	180.4998	41.75786	0.23	3	3	50
72.92666	180.4998	46.39762	0.23	3	3	51
72.92666	180.4998	51.03738	0.23	3	3	52
72.92666	180.4998	55.67715	0.23	3	3	53
72.92666	180.4998	60.31691	0.23	3	3	54
72.92666	180.4998	64.95667	0.23	3	3	55
72.92666	180.4998	69.59643	0.23	3	3	56
72.92666	180.4998	74.23619	0.23	3	3	57
72.92666	180.4998	78.87596	0.23	3	3	58
72.92666	180.4998	83.51572	0.23	3	3	59
72.92666	180.4998	88.15548	0.23	3	0	60

```
Sources:  1
Pulse No., Voltage Magnitude, Phase (Degrees): 41, 1.0, 0.0

Number of Loads:  2
Pulse No., Resistance, Reactance:  1 , 0 ,-10000
Pulse No., Resistance, Reactance:  21 , 0 ,-10000

********************    SOURCE DATA     ********************
Pulse  41     Voltage = (1.0, 0.0j)
              Current = (0.0286, 0.0022j)
              Impedance = (34.798, -2.676j)
              Power = 0.014284 Watts
```

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = KCBC-3.cir

I	1.0000	0	1	.0000	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	3.4700	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	34.7980	3	0	-2.6760	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = .770

NODE	VOLT MAG	VOLT PHASE
1	38.2076	20.8354
2	37.2747	21.3821
3	34.8561	-5.2645

			BRANCH VOLTAGE MAG	BRANCH VOLTAGE PHASE	BRANCH CURRENT MAG	BRANCH CURRENT PHASE	FROM NODE IMPEDANCE RESISTANCE	FROM NODE IMPEDANCE REACTANCE	TO NODE IMPEDANCE RESISTANCE	TO NODE IMPEDANCE REACTANCE	VSWR
R	1- 2	1.000	1.00	.000	1.00	.000	35.71	13.59	34.71	13.59	
L	2- 3	3.470	16.79	90.000	1.00	.000	34.71	13.59	34.71	-3.20	
C	3- 0	.000	34.86	-5.265	.02	84.735	.00	-2296.61	.00	.00	
R	3- 0	34.798	34.86	-5.265	1.00	-.867	34.80	-2.68	.00	.00	

Derivation of Operating Parameters for Daytime Directional Antenna

Once calibrated against the measured individual open-circuited base impedances, the moment method model was utilized for daytime directional antenna calculations. These calculations were made to determine the complex voltage source values to be applied at ground level for each tower of the array to produce the current moment sums for the towers which, when normalized to the reference tower, equate to the theoretical field parameters of the authorized directional pattern. These voltage sources were then applied in the model and the tower currents were calculated.

Alternate Mode

The KCBC licensed daytime operation is somewhat unique in that the array was originally configured and licensed using the "inverted" or alternate mode (mode 2) rather than the theoretical mode (mode 1). The theoretical parameters for the KCBC daytime array are as follows:

Twr.	Ratio	Phase
1	1.000	0.0
2	1.200	+104.0
3	0.360	+208.0

The alternate mode parameters are:

Twr.	Ratio	Phase
1	0.360	-208.0
2	1.200	-104.0
3	1.000	0.0

Normalized to a tower 2 reference, the theoretical parameters become:

Twr.	Ratio	Phase
1	0.300	-104.0
2	1.000	0.0
3	0.833	+104.0

Because the existing KCBC daytime phasing and coupling system was designed for operation in the alternate mode and because the alternate mode provides for much better power distribution and bandwidth, it is desired to continue operation in the "inverted" or alternate mode (mode 2). As such, the alternate mode tower-2-normalized parameters were used in the daytime directional antenna model.

Daytime Antenna Model

Twenty segments were used for each tower. The KCBC towers are base sampled, which is permitted for towers of 120 electrical degrees or less. As such, the first (ground) segment of each tower was used to determine the model operating parameters of the array.

A circuit model was constructed to determine the effect of the series feed inductance and shunt base region capacitance on the ATU output current. Again, this model was used with the Westberg Circuit Analysis Program (WCAP).

This effect was, as expected, minimal, and the results are tabulated in the table below along with the base operating parameters for the daytime array.

Twr.	Node	Current Magnitude (amperes)	Current Phase (degrees)	WCAP Current Offset for Unity I_{BASE}	WCAP Phase Offset for Unity $\emptyset_{BASE}$ (degrees)	Antenna Monitor Ratio	Antenna Monitor Phase (degrees)
1	1	10.4151	-97.2	1.060	-2.4	0.235	-99.4
2	21	41.9038	+3.6	1.004	-1.0	1.000	0.0
3	41	36.4259	105.7	0.993	-0.4	0.879	+101.5

****
ACSModel
(MININEC 3.1 Core)
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****

KCBC
Directional Antenna Day

Frequency = 0.770 MHz Wavelength = 389.35066 Meters

No. of Wires: 3

Wire No. 1 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
0	0	0		-1	
0	0	92.57893	0.23	0	20

Wire No. 2 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
36.46333	90.24991	0		-2	
36.46333	90.24991	92.5519	0.23	0	20

Wire No. 3 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
72.92666	180.4998	0		-3	
72.92666	180.4998	92.79524	0.23	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
0	0	0	0.23	-1	1	1
0	0	4.628947	0.23	1	1	2
0	0	9.257894	0.23	1	1	3
0	0	13.88684	0.23	1	1	4
0	0	18.51579	0.23	1	1	5
0	0	23.14473	0.23	1	1	6
0	0	27.77368	0.23	1	1	7
0	0	32.40263	0.23	1	1	8
0	0	37.03157	0.23	1	1	9
0	0	41.66052	0.23	1	1	10
0	0	46.28947	0.23	1	1	11
0	0	50.91842	0.23	1	1	12
0	0	55.54736	0.23	1	1	13
0	0	60.17631	0.23	1	1	14
0	0	64.80525	0.23	1	1	15
0	0	69.4342	0.23	1	1	16
0	0	74.06315	0.23	1	1	17
0	0	78.69209	0.23	1	1	18
0	0	83.32104	0.23	1	1	19
0	0	87.94999	0.23	1	0	20

Wire No. 2 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
36.46333	90.24991	0	0.23	-2	2	21
36.46333	90.24991	4.627595	0.23	2	2	22
36.46333	90.24991	9.25519	0.23	2	2	23
36.46333	90.24991	13.88278	0.23	2	2	24
36.46333	90.24991	18.51038	0.23	2	2	25
36.46333	90.24991	23.13797	0.23	2	2	26
36.46333	90.24991	27.76557	0.23	2	2	27
36.46333	90.24991	32.39317	0.23	2	2	28
36.46333	90.24991	37.02076	0.23	2	2	29
36.46333	90.24991	41.64835	0.23	2	2	30
36.46333	90.24991	46.27595	0.23	2	2	31
36.46333	90.24991	50.90354	0.23	2	2	32
36.46333	90.24991	55.53114	0.23	2	2	33
36.46333	90.24991	60.15873	0.23	2	2	34
36.46333	90.24991	64.78633	0.23	2	2	35
36.46333	90.24991	69.41393	0.23	2	2	36
36.46333	90.24991	74.04152	0.23	2	2	37
36.46333	90.24991	78.66911	0.23	2	2	38
36.46333	90.24991	83.29671	0.23	2	2	39
36.46333	90.24991	87.9243	0.23	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
72.92666	180.4998	0	0.23	-3	3	41
72.92666	180.4998	4.639762	0.23	3	3	42
72.92666	180.4998	9.279524	0.23	3	3	43
72.92666	180.4998	13.91929	0.23	3	3	44
72.92666	180.4998	18.55905	0.23	3	3	45
72.92666	180.4998	23.19881	0.23	3	3	46
72.92666	180.4998	27.83857	0.23	3	3	47
72.92666	180.4998	32.47834	0.23	3	3	48
72.92666	180.4998	37.1181	0.23	3	3	49
72.92666	180.4998	41.75786	0.23	3	3	50
72.92666	180.4998	46.39762	0.23	3	3	51
72.92666	180.4998	51.03738	0.23	3	3	52
72.92666	180.4998	55.67715	0.23	3	3	53
72.92666	180.4998	60.31691	0.23	3	3	54
72.92666	180.4998	64.95667	0.23	3	3	55
72.92666	180.4998	69.59643	0.23	3	3	56
72.92666	180.4998	74.23619	0.23	3	3	57
72.92666	180.4998	78.87596	0.23	3	3	58
72.92666	180.4998	83.51572	0.23	3	3	59
72.92666	180.4998	88.15548	0.23	3	0	60

Sources: 3
Pulse No., Voltage Magnitude, Phase (Degrees): 1, 1678.7, -41.1
Pulse No., Voltage Magnitude, Phase (Degrees): 21, 1666.5, 18.0
Pulse No., Voltage Magnitude, Phase (Degrees): 41, 858.9, 62.1

Number of Loads: 0

********** SOURCE DATA **********
Pulse 1 Voltage = (1265.7015, -1102.6646j)
Current = (-1.306, -10.3329j)
Impedance = (89.796, 133.842j)
Power = 4870.35 Watts

Pulse 21 Voltage = (1585.04, 514.6601j)
Current = (41.8233, 2.5971j)
Impedance = (38.514, 9.914j)
Power = 33814.1 Watts

Pulse 41 Voltage = (402.1496, 758.9046j)
Current = (-9.8851, 35.059j)
Impedance = (17.056, -16.28j)
Power = 11315.55 Watts

Total Power = 50000.002 Watts

********** CURRENT DATA **********

Wire No. 1 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
1	-1.306	-10.3329	10.4151	-97.2038
2	-1.7826	-10.8556	11.001	-99.3251
3	-2.0796	-11.1238	11.3165	-100.5891
4	-2.3094	-11.2667	11.5009	-101.5837
5	-2.4867	-11.3017	11.572	-102.4092
6	-2.6179	-11.2366	11.5376	-103.1145
7	-2.7059	-11.0761	11.4019	-103.7286
8	-2.7529	-10.8234	11.168	-104.2705
9	-2.7602	-10.4814	10.8387	-104.7536
10	-2.729	-10.0527	10.4165	-105.1882
11	-2.6604	-9.5401	9.9041	-105.5819
12	-2.5554	-8.9464	9.3042	-105.9409
13	-2.4149	-8.2743	8.6195	-106.2703
14	-2.2401	-7.5267	7.853	-106.5743
15	-2.0318	-6.7059	7.007	-106.8563
16	-1.7908	-5.8142	6.0837	-107.1195
17	-1.5175	-4.8522	5.084	-107.3666
18	-1.2114	-3.8187	4.0063	-107.6001
19	-0.8702	-2.7067	2.8432	-107.8226
20	-0.4866	-1.4942	1.5714	-108.0382
E	0.0	0.0	0.0	0.0

Wire No. 2 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
21	41.8233	2.5971	41.9038	3.5533
22	41.9306	1.8994	41.9736	2.5937
23	41.7247	1.4342	41.7494	1.9686
24	41.2595	1.0401	41.2727	1.4441
25	40.5447	0.6964	40.5507	0.984
26	39.5867	0.3946	39.5887	0.571
27	38.3917	0.1307	38.392	0.195
28	36.9664	-0.0974	36.9665	-0.1509
29	35.3176	-0.2907	35.3188	-0.4716
30	33.4534	-0.4501	33.4564	-0.7709
31	31.3819	-0.5761	31.3872	-1.0517
32	29.112	-0.669	29.1197	-1.3165
33	26.6526	-0.7293	26.6626	-1.5674
34	24.0128	-0.7571	24.0247	-1.806
35	21.2007	-0.7529	21.214	-2.0339
36	18.2229	-0.7167	18.237	-2.2524
37	15.0826	-0.6487	15.0966	-2.4629
38	11.7762	-0.5485	11.7889	-2.6665
39	8.2832	-0.4145	8.2935	-2.8648
40	4.5383	-0.2427	4.5448	-3.0607
E	0.0	0.0	0.0	0.0

Wire No. 3 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
41	-9.8851	35.059	36.4259	105.7462
42	-9.5256	34.7855	36.0662	105.3143
43	-9.2276	34.3793	35.5961	105.0244
44	-8.9144	33.8007	34.9565	104.7744
45	-8.5767	33.0467	34.1416	104.5491
46	-8.2114	32.1183	33.1513	104.3411
47	-7.8179	31.0183	31.9884	104.1463
48	-7.3967	29.751	30.6567	103.9618
49	-6.9489	28.3215	29.1616	103.7857
50	-6.4761	26.7358	27.509	103.6163
51	-5.9801	25.0002	25.7055	103.4526
52	-5.463	23.1218	23.7584	103.2935
53	-4.9267	21.1076	21.675	103.1382
54	-4.3735	18.9647	19.4624	102.9862
55	-3.8053	16.6995	17.1276	102.8368
56	-3.2238	14.3174	14.6759	102.6896
57	-2.6302	11.821	12.11	102.544
58	-2.0243	9.2074	9.4273	102.3996
59	-1.4035	6.4611	6.6117	102.2557
60	-0.7578	3.5315	3.6119	102.1103
E	0.0	0.0	0.0	0.0

********** BASE OPERATING PARAMETERS **********

Twr.	Ratio	Phase
1	0.249	-100.8
2	1.000	0.0
3	0.869	102.2

Current Moments (amp-meters) Peak

Frequency: 770 kHz
Input Power: 50,000 Watts

Wire	Real	Imag	Vert. Current Moment Magnitude	Phase
1	-188.1962	-754.8145	777.9221	-104.00
2	2593.0734	0.0001	2593.0734	0.00
3	-522.5586	2095.8683	2160.0304	104.00

Medium wave array vertical current moment (amps-meters) peak
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

Tower	Real	Imag	Magnitude	Phase
1	-188.1962	-754.8145	777.9221	-104.00
2	2593.0734	0.0001	2593.0734	0.00
3	-522.5586	2095.8683	2160.0304	104.00

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = KCBC-D1.CIR

I	9.8163	0	1	-94.8268	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	3.6300	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	89.7960	3	0	133.8420	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = .770

NODE	VOLT MAG	VOLT PHASE
1	1825.8700	-38.1118
2	1820.5010	-37.8535
3	1678.5940	-41.0624

				BRANCH VOLTAGE MAG	BRANCH VOLTAGE PHASE	BRANCH CURRENT FROM NODE IMPEDANCE MAG	BRANCH CURRENT FROM NODE IMPEDANCE PHASE	FROM NODE IMPEDANCE RESISTANCE	FROM NODE IMPEDANCE REACTANCE	TO NODE IMPEDANCE RESISTANCE	TO NODE IMPEDANCE REACTANCE	VSWR
R	1-	2	1.000	9.82	-94.827	9.82	-94.827	102.08	155.49	101.08	155.49	
L	2-	3	3.630	172.40	-4.827	9.82	-94.827	101.08	155.49	101.08	137.93	
C	3-	0	.000	1678.59	-41.062	.73	48.938	.00	-2296.61	.00	.00	
R	3-	0	89.796	1678.59	-41.062	10.41	-97.204	89.80	133.84	.00	.00	

FILE NAME = KCBC-D2.CIR

I	41.7285	0	1	4.5183	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	2.8700	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	38.5140	3	0	9.9140	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = .770

NODE	VOLT MAG	VOLT PHASE
1	1923.4650	34.7204
2	1887.5170	35.3577
3	1666.4810	17.9887

				BRANCH VOLTAGE MAG	BRANCH VOLTAGE PHASE	BRANCH CURRENT FROM NODE IMPEDANCE MAG	BRANCH CURRENT FROM NODE IMPEDANCE PHASE	FROM NODE IMPEDANCE RESISTANCE	FROM NODE IMPEDANCE REACTANCE	TO NODE IMPEDANCE RESISTANCE	TO NODE IMPEDANCE REACTANCE	VSWR
R	1-	2	1.000	41.73	4.518	41.73	4.518	39.84	23.19	38.84	23.19	
L	2-	3	2.870	579.41	94.518	41.73	4.518	38.84	23.19	38.84	9.30	
C	3-	0	.000	1666.48	17.989	.73	107.989	.00	-2296.61	.00	.00	
R	3-	0	38.514	1666.48	17.989	41.90	3.553	38.51	9.91	.00	.00	

FILE NAME = KCBC-D3.CIR

I	36.6864	0	1	106.1692	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	3.4700	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	17.0560	3	0	-16.2800	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = .770

NODE	VOLT MAG	VOLT PHASE
1	653.8544	107.7724
2	617.1832	107.8677
3	858.8983	62.0802

				BRANCH VOLTAGE MAG	BRANCH VOLTAGE PHASE	BRANCH CURRENT FROM NODE IMPEDANCE MAG	BRANCH CURRENT FROM NODE IMPEDANCE PHASE	FROM NODE IMPEDANCE RESISTANCE	FROM NODE IMPEDANCE REACTANCE	TO NODE IMPEDANCE RESISTANCE	TO NODE IMPEDANCE REACTANCE	VSWR
R	1-	2	1.000	36.69	106.169	36.69	106.169	17.82	.50	16.82	.50	
L	2-	3	3.470	615.89	-163.831	36.69	106.169	16.82	.50	16.82	-16.29	
C	3-	0	.000	858.90	62.080	.37	152.080	.00	-2296.61	.00	.00	
R	3-	0	17.056	858.90	62.080	36.43	105.747	17.06	-16.28	.00	.00	

Derivation of Operating Parameters for Nighttime Directional Antenna

As with the daytime array, once calibrated against the measured individual open-circuited base impedances, the moment method model was utilized for nighttime directional antenna calculations. These calculations were made to determine the complex voltage source values to be applied at ground level for each tower of the array to produce the current moment sums for the towers which, when normalized to the reference tower, equate to the theoretical field parameters of the authorized directional pattern. These voltage sources were then applied in the model and the tower currents were calculated.

Nighttime Antenna Model

As with the daytime array, twenty segments were used for each tower. The KCBC towers are base sampled for the nighttime pattern as well as the day, so the first (ground) segment of each tower was used to determine the model operating parameters of the array.

A circuit model was constructed to determine the effect of the series feed inductance and shunt base region capacitance on the ATU output current. Again, this model was used with the Westberg Circuit Analysis Program (WCAP).

This effect was, as expected, minimal, and the results are tabulated in the table below along with the base operating parameters for the nighttime array.

Twr.	Node	Current Magnitude (amperes)	Current Phase (degrees)	WCAP Current Offset for Unity I_{BASE}	WCAP Phase Offset for Unity $Ø_{BASE}$ (degrees)	Antenna Monitor Ratio	Antenna Monitor Phase (degrees)
1	1	12.1851	-134.6	1.015	-0.4	0.658	-135.7
2	21	18.2917	+1.2	1.004	-0.3	1.000	0.0
3	41	12.0258	151.1	0.997	-0.3	0.662	+149.9

****
ACSModel
(MININEC 3.1 Core)
01-07-2010 13:33:52
****

KCBC
Directional Antenna Night

Frequency = 0.770 MHz Wavelength = 389.35066 Meters

No. of Wires: 3

Wire No. 1 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
0	0	0		-1	
0	0	92.57893	0.23	0	20

Wire No. 2 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
36.46333	90.24991	0		-2	
36.46333	90.24991	92.5519	0.23	0	20

Wire No. 3 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
72.92666	180.4998	0		-3	
72.92666	180.4998	92.79524	0.23	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
0	0	0	0.23	-1	1	1
0	0	4.628947	0.23	1	1	2
0	0	9.257894	0.23	1	1	3
0	0	13.88684	0.23	1	1	4
0	0	18.51579	0.23	1	1	5
0	0	23.14473	0.23	1	1	6
0	0	27.77368	0.23	1	1	7
0	0	32.40263	0.23	1	1	8
0	0	37.03157	0.23	1	1	9
0	0	41.66052	0.23	1	1	10
0	0	46.28947	0.23	1	1	11
0	0	50.91842	0.23	1	1	12
0	0	55.54736	0.23	1	1	13
0	0	60.17631	0.23	1	1	14
0	0	64.80525	0.23	1	1	15
0	0	69.4342	0.23	1	1	16
0	0	74.06315	0.23	1	1	17
0	0	78.69209	0.23	1	1	18
0	0	83.32104	0.23	1	1	19
0	0	87.94999	0.23	1	0	20

Wire No. 2 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
36.46333	90.24991	0	0.23	-2	2	21
36.46333	90.24991	4.627595	0.23	2	2	22
36.46333	90.24991	9.25519	0.23	2	2	23
36.46333	90.24991	13.88278	0.23	2	2	24
36.46333	90.24991	18.51038	0.23	2	2	25
36.46333	90.24991	23.13797	0.23	2	2	26
36.46333	90.24991	27.76557	0.23	2	2	27
36.46333	90.24991	32.39317	0.23	2	2	28
36.46333	90.24991	37.02076	0.23	2	2	29
36.46333	90.24991	41.64835	0.23	2	2	30
36.46333	90.24991	46.27595	0.23	2	2	31
36.46333	90.24991	50.90354	0.23	2	2	32
36.46333	90.24991	55.53114	0.23	2	2	33
36.46333	90.24991	60.15873	0.23	2	2	34
36.46333	90.24991	64.78633	0.23	2	2	35
36.46333	90.24991	69.41393	0.23	2	2	36
36.46333	90.24991	74.04152	0.23	2	2	37
36.46333	90.24991	78.66911	0.23	2	2	38
36.46333	90.24991	83.29671	0.23	2	2	39
36.46333	90.24991	87.9243	0.23	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
72.92666	180.4998	0	0.23	-3	3	41
72.92666	180.4998	4.639762	0.23	3	3	42
72.92666	180.4998	9.279524	0.23	3	3	43
72.92666	180.4998	13.91929	0.23	3	3	44
72.92666	180.4998	18.55905	0.23	3	3	45
72.92666	180.4998	23.19881	0.23	3	3	46
72.92666	180.4998	27.83857	0.23	3	3	47
72.92666	180.4998	32.47834	0.23	3	3	48
72.92666	180.4998	37.1181	0.23	3	3	49
72.92666	180.4998	41.75786	0.23	3	3	50
72.92666	180.4998	46.39762	0.23	3	3	51
72.92666	180.4998	51.03738	0.23	3	3	52
72.92666	180.4998	55.67715	0.23	3	3	53
72.92666	180.4998	60.31691	0.23	3	3	54
72.92666	180.4998	64.95667	0.23	3	3	55
72.92666	180.4998	69.59643	0.23	3	3	56
72.92666	180.4998	74.23619	0.23	3	3	57
72.92666	180.4998	78.87596	0.23	3	3	58
72.92666	180.4998	83.51572	0.23	3	3	59
72.92666	180.4998	88.15548	0.23	3	0	60

Sources: 3
Pulse No., Voltage Magnitude, Phase (Degrees): 1, 474.2, -68.9
Pulse No., Voltage Magnitude, Phase (Degrees): 21, 286.9, 37.2
Pulse No., Voltage Magnitude, Phase (Degrees): 41, 163.7, 114.3

Number of Loads: 0

********** SOURCE DATA **********
Pulse 1 Voltage = (170.691, -442.4496j)
Current = (-8.5578, -8.6741j)
Impedance = (16.01, 35.474j)
Power = 1188.56 Watts

Pulse 21 Voltage = (228.5323, 173.5086j)
Current = (18.2876, 0.3841j)
Impedance = (12.69, 9.221j)
Power = 2122.98 Watts

Pulse 41 Voltage = (-67.4043, 149.2105j)
Current = (-10.5277, 5.8125j)
Impedance = (10.904, -8.153j)
Power = 788.45 Watts

Total Power = 4100.000 Watts

********** CURRENT DATA **********

Wire No. 1 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
1	-8.5578	-8.6741	12.1851	-134.6132
2	-8.7265	-8.7243	12.3396	-135.0073
3	-8.7784	-8.6996	12.359	-135.2585
4	-8.7589	-8.6177	12.2875	-135.4654
5	-8.6743	-8.4815	12.1318	-135.6439
6	-8.528	-8.2927	11.8952	-135.8014
7	-8.3221	-8.0527	11.5803	-135.9425
8	-8.0584	-7.7629	11.1893	-136.0701
9	-7.7389	-7.4249	10.7248	-136.1864
10	-7.3655	-7.0403	10.189	-136.2931
11	-6.9401	-6.6109	9.5848	-136.3914
12	-6.4647	-6.1385	8.9148	-136.4825
13	-5.9415	-5.625	8.1818	-136.5673
14	-5.3725	-5.0723	7.3886	-136.6465
15	-4.7597	-4.482	6.5378	-136.7209
16	-4.1045	-3.8556	5.6314	-136.7911
17	-3.4078	-3.1937	4.6704	-136.8576
18	-2.6687	-2.4955	3.6537	-136.921
19	-1.8825	-1.7566	2.5748	-136.9819
20	-1.0343	-0.9631	1.4133	-137.0415
E	0.0	0.0	0.0	0.0

Wire No. 2 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
21	18.2876	0.3841	18.2917	1.2034
22	18.3119	0.2834	18.3141	0.8866
23	18.2069	0.2159	18.2081	0.6793
24	17.9909	0.1583	17.9916	0.5042
25	17.6675	0.1077	17.6678	0.3494
26	17.2393	0.063	17.2394	0.2094
27	16.7089	0.0235	16.7089	0.0806
28	16.0793	-0.0109	16.0793	-0.039
29	15.3534	-0.0405	15.3535	-0.1511
30	14.5349	-0.0652	14.5351	-0.257
31	13.6274	-0.085	13.6276	-0.3575
32	12.6347	-0.1	12.6351	-0.4535
33	11.5611	-0.1101	11.5616	-0.5457
34	10.4103	-0.1153	10.4109	-0.6345
35	9.1861	-0.1155	9.1869	-0.7205
36	7.8916	-0.1108	7.8923	-0.8041
37	6.5281	-0.1009	6.5289	-0.8857
38	5.0942	-0.0859	5.0949	-0.9657
39	3.5812	-0.0653	3.5818	-1.0446
40	1.961	-0.0385	1.9614	-1.1236
E	0.0	0.0	0.0	0.0

Wire No. 3 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
41	-10.5277	5.8125	12.0258	151.0962
42	-10.4329	5.8257	11.9493	150.8211
43	-10.302	5.796	11.8205	150.6378
44	-10.1204	5.7304	11.6301	150.4805
45	-9.8867	5.6303	11.3775	150.3393
46	-9.6012	5.4965	11.0632	150.2096
47	-9.2648	5.3299	10.6885	150.0886
48	-8.8787	5.1314	10.2549	149.9744
49	-8.4448	4.902	9.7644	149.8657
50	-7.9647	4.6427	9.2191	149.7616
51	-7.4407	4.3548	8.6214	149.6613
52	-6.875	4.0393	7.9738	149.5641
53	-6.2698	3.6977	7.279	149.4695
54	-5.6274	3.3311	6.5394	149.3772
55	-4.9499	2.9406	5.7575	149.2867
56	-4.2391	2.5273	4.9353	149.1977
57	-3.496	2.0915	4.0738	149.11
58	-2.7198	1.6327	3.1723	149.0233
59	-1.9063	1.1482	2.2254	148.937
60	-1.0406	0.629	1.2159	148.8502
E	0.0	0.0	0.0	0.0

********** BASE OPERATING PARAMETERS **********

Twr.	Ratio	Phase
1	0.666	-135.8
2	1.000	0.0
3	0.657	149.9

Current Moments (amp-meters) Peak

Frequency: 770 kHz
Input Power: 4,100 Watts

Wire	Real	Imag	Vert. Current Moment Magnitude	Phase
1	-563.8345	-544.4886	783.8222	-136.00
2	1127.8018	0.0000	1127.8018	0.00
3	-625.0912	360.8965	721.7932	150.00

Medium wave array vertical current moment (amps-meters) peak
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

Tower	Real	Imag	Magnitude	Phase
1	-563.8345	-544.4886	783.8222	-136.00
2	1127.8018	0.0000	1127.8018	0.00
3	-625.0912	360.8965	721.7932	150.00

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = KCBC-N1.CIR

I	11.9968	0	1	-134.2072	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	3.6300	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	16.0100	3	0	35.4740	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = .770

NODE	VOLT MAG	VOLT PHASE
1	675.0740	-62.3429
2	671.4366	-61.3700
3	474.2224	-68.9033

			BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
VSWR			MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
R	1- 2	1.000	12.00	-134.207	12.00	-134.207	17.52	53.48	16.52	53.48
L	2- 3	3.630	210.69	-44.207	12.00	-134.207	16.52	53.48	16.52	35.91
C	3- 0	.000	474.22	-68.903	.21	21.097	.00	-2296.61	.00	.00
R	3- 0	16.010	474.22	-68.903	12.18	-134.613	16.01	35.47	.00	.00

FILE NAME = KCBC-N2.CIR

I	18.2188	0	1	1.5214	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	2.8700	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	12.6900	3	0	9.2210	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = .770

NODE	VOLT MAG	VOLT PHASE
1	489.7297	60.6515
2	480.6362	62.5159
3	286.9349	37.2070

			BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
VSWR			MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
R	1- 2	1.000	18.22	1.521	18.22	1.521	13.79	23.07	12.79	23.07
L	2- 3	2.870	252.97	91.521	18.22	1.521	12.79	23.07	12.79	9.19
C	3- 0	.000	286.93	37.207	.12	127.207	.00	-2296.61	.00	.00
R	3- 0	12.690	286.93	37.207	18.29	1.204	12.69	9.22	.00	.00

FILE NAME = KCBC-N3.CIR

I	12.0680	0	1	151.3672	.0000	.0000
R	1.0000	1	2	.0000	.0000	.0000
L	3.4700	2	3	.0000	.0000	.0000
C	.0001	3	0	.0000	.0000	.0000
R	10.9070	3	0	-8.1530	.0000	.0000
EX	.0000	0	0	.0000	.0000	.0000

FREQ = .770

NODE	VOLT MAG	VOLT PHASE
1	176.5891	-172.5763
2	166.9840	-170.1384
3	163.7518	114.3179

			BRANCH VOLTAGE		BRANCH CURRENT		FROM NODE IMPEDANCE		TO NODE IMPEDANCE	
VSWR			MAG	PHASE	MAG	PHASE	RESISTANCE	REACTANCE	RESISTANCE	REACTANCE
R	1- 2	1.000	12.07	151.367	12.07	151.367	11.83	8.61	10.83	8.61
L	2- 3	3.470	202.60	-118.633	12.07	151.367	10.83	8.61	10.83	-8.18
C	3- 0	.000	163.75	114.318	.07	-155.682	.00	-2296.61	.00	.00
R	3- 0	10.907	163.75	114.318	12.03	151.096	10.91	-8.15	.00	.00

Summary of Post Construction Certified Array Geometry

With respect to Question 9, Section III, Page 2 of the attached Form 302-AM, the tower information is as follows:

Tower No.	ASRN	Height above base insulator (meters)	Height above ground w/o obst. lighting (meters)	Overall height above ground (meters)
1	1012846	88.4	89.8	90.8
2	1012847	88.4	89.8	90.8
3	1012848	88.4	89.8	90.8

All towers are uniform cross-section, steel, guyed vertical radiators.

Because KCBC is an existing licensed facility, in accordance with the Public Notice, Media Bureau Clarifies Procedures for AM Directional Antenna Performance Verification Using Moment Method Modeling (FCC DA 09-2340) dated October 29, 2009, it is exempt from the requirement to submit a surveyor's certification.

Sampling System

The sampling system consists of Delta Electronics TCT-1 current transformers installed at the output of each antenna tuning unit, immediately adjacent to the final J-plug. Samples from the current transformers are fed to the antenna monitor via equal lengths of 1/4-inch foam-dielectric coaxial transmission lines. The antenna monitor is a Potomac Instruments Type 1901.

Impedance measurements were made of the antenna sampling system using an Array Solutions AIM417B network analyzer. The measurements were made looking into the antenna monitor ends of the sample lines with the tower ends of the sample lines open-circuited.

The table below shows the frequencies above and below the carrier frequency where resonance, defined as zero reactance corresponding with low resistance, was found. As the length of distortionless transmission line is 180 electrical degrees at the difference frequency between adjacent frequencies of resonance, and frequencies of resonance occur at odd multiples of 90 degrees electrical length, the sample line length at the resonant frequency above carrier frequency, which is the closest one to the carrier frequency, was found to be 270 electrical degrees. The electrical length at carrier frequency appearing in the table below was calculated by ratioing the frequencies.

Twr.	Sample Line Open-Circuited Resonance Below 770 kHz (kHz)	Sample Line Open-Circuited Resonance Above 770 kHz (kHz)	Sample Line Calculated Electrical Length At 770 kHz (deg.)
1	345.08	1043.9	199.2
2	345.08	1043.9	199.2
3	345.08	1043.6	199.2

Because the electrical lengths were determined to be identical to within the nearest 0.1 degree, the sample lines meet the requirement in the Rules that they be equal in length within one electrical degree.

To determine the characteristic impedance values of the sample lines, open-circuited measurements were made with frequencies offset to produce ± 45 degrees of electrical length from resonance.

The characteristic impedance was calculated using the following formula, where $R_1 + jX_1$ and $R_2 + jX_2$ are the measured impedances at the +45 and -45 degree offset frequencies, respectively:

$$Z_O = ((R_1^2 + X_1^2)^{1/2} \times (R_2^2 + X_2^2)^{1/2})^{1/2}$$

Twr.	+ 45 Deg. Offset Frequency (kHz)	+45 Deg. Measured Impedance (ohms)	- 45 Deg. Offset Frequency (kHz)	-45 Deg. Measured Impedance (ohms)	Calculated Characteristic Impedance (ohms)
1	1217.883	9.7 +j48.9	869.917	6.6 –j49.3	49.8
2	1217.883	9.7 +j48.9	869.917	6.5 –j49.2	49.3
3	1217.533	9.7 +j48.9	869.667	6.5 –j49.1	49.7

The sample line measured characteristic impedances meet the requirement that they be equal within 2 ohms.

The calibration of the Delta TCT-1 current transformers was verified by removing them all from the ATUs and installing them on a test jig so that each was located very close to the adjacent transformer (spacing of less than two inches). Short transmission lines of equal length were connected between the outputs of all four current transformers and the inputs of the antenna monitor. The Potomac 1901 antenna monitor was calibrated using the internal calibration function. A single source of RF current on the carrier frequency was fed through a conductor passing through all of the current transformers, and the differential phases and ratios were noted on the antenna monitor as follows:

Twr.	Serial No.	Ratio	Phase (deg.)
1	2256	1.001	+0.3
2	2247	Ref.	Ref.
3	2123	0.998	-0.1

The requirement that the sample current transformers are accurate to within the manufacturer's specification (±2% ratio and ±2 degrees phase) has thus been demonstrated.

The impedance of each of the sample lines was measured with the sample current transformers attached. These impedances are tabulated below:

Twr.	R (ohms)	X (ohms)
1	51.4	+j0.7
2	51.1	+j0.2
3	51.0	+j0.6

Direct Measurement of Power

Common point impedance measurements were made using a Delta CPB-1A common point bridge installed in the common point bus of the phasing and coupling system. The resistance value was adjusted to 50 ohms and the reactance value was adjusted to zero.

Appendix A

Reference Field Strength Measurements

Reference field strength measurements were made on March 13-15, 2010 using a Potomac Instruments FIM-41 S/N 2142 and a Potomac Instruments FIM-21 S/N 688. Measurements were made at three locations along radials at the azimuths with radiation values specified on the construction permit and, additionally, on the major lobe radial. The measured field strengths and descriptions and NAD-27 GPS coordinates for the reference measurement points are shown in the following tables.

Daytime

Radial 35.5°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	5.14	37-50-07	120-51-00	03/14/2010	1423	46.0
2	8.37	37-51-34	120-49-41	03/14/2010	1431	16.6
3	11.10	37-52-45	120-48-37	03/15/2010	1648	15.2

Radial 68.0°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	4.18	37-48-42	120-50-24	03/14/2010	1416	65.5
2	8.05	37-49-28	120-47-58	03/15/2010	1706	39.8
3	15.61	37-50-57	120-43-13	03/14/2010	1512	16.4

Radial 100.5°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	3.93	37-47-31	120-50-44	03/14/2010	1255	62.0
2	6.95	37-47-09	120-48-20	03/14/2010	1241	21.5
3	10.27	37-46-57	120-46-49	03/14/2010	1233	13.8

Radial 248°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	3.67	37-47-07	120-55-19	03/14/2010	1308	900.0
2	8.00	37-46-14	120-58-03	03/14/2010	1317	400.0
3	20.79	37-43-38	121-06-11	03/14/2010	1339	108.0

Nighttime

Radial 1.5°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	3.38	37-49-40	120-52-58	03/15/2010	1802	73.5
2	6.60	37-51-25	120-52-54	03/13/2010	1336	32.5
3	9.81	37-53-11	120-52-51	03/15/2010	1820	24.0

Radial 39.5°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	2.25	37-48-47	120-52-04	03/15/2010	1756	50.5
2	5.47	37-50-07	120-50-40	03/15/2010	1809	15.8
3	11.26	37-52-33	120-48-10	03/13/2010	1258	6.3

Radial 68°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	4.18	37-48-42	120-50-24	03/13/2010	1221	38.0
2	7.88	37-49-28	120-48-07	03/13/2010	1232	21.2
3	15.61	37-50-57	120-43-13	03/13/2010	1248	10.5

Radial 96.5°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	3.90	37-47-37	120-50-21	03/15/2010	1753	21.1
2	5.40	37-47-32	120-49-21	03/15/2010	1747	16.0
3	10.57	37-47-12	120-45-50	03/15/2010	1734	5.4

Radial 134.5°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	5.44	37-46-47	120-50-22	03/13/2010	1154	47.0
2	10.80	37-43-44	120-47-48	03/13/2010	1135	17.0
3	13.60	37-42-40	120-46-27	03/13/2010	1121	15.4

Radial 161°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	4.10	37-45-45	120-52-03	10/15/2010	1812	31.0
2	7.63	37-43-58	120-51-18	10/15/2010	1822	13
3	10.14	37-42-40	120-50-44	10/15/2010	1831	9.1

Radial 248°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	3.67	37-47-07	120-55-19	03/13/2010	1319	300.0
2	8.00	37-46-14	120-58-03	03/13/2010	1333	132.0
3	20.79	37-43-38	121-06-09	03/13/2010	1405	35.0

Radial 335°

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	3.70	37-49-41	120-54-06	03/15/2010	1746	24.6
2	7.24	37-51-25	120-55-05	03/13/2010	1341	12.2
3	16.25	37-55-50	120-57-44	03/13/2010	1406	5.3